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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : RAANAN LIEBERMANN Docket No.: 00-422RE
Serial No. : Examiner :
Filed : Art Unit :
For : TELEPHONE FOR THE DEAF
AND METHOD OF USING SAME

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INFORMATION DISCLOSURE STATEMENT

Hon. Commissioner of Patents and Trademarks
United States Patent & Trademark Office
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Dear Sir:

In accordance with the requirements of 37 C.F.R. 1.97
and 1.98, Applicant hereby submits the prior art documents
listed hereinbelow, copies enclosed.

- (1) U.S. Patent 4,546,383 for METHOD AND APPARATUS FOR
VISUAL TELECOMMUNICATIONS, IN PARTICULAR FOR USE BY THE
DEAF, By Jean-Francois Abramatic et al., Issued October
8, 1985.

This invention relates to, in a system for visual
telecommunications, e.g. for use by deaf people, an
electronic camera (20) which makes an image of a moving
subject for transmission. The TV type image is passed
through a contour extractor (25) to be converted to an
animated cartoon line-drawing type image. The contour
image is then compressed by means including a sampler
(28) for image reduction, a difference detector (30)

for selecting only points which change from one image to the next, a filter (34) for rejecting isolated points in the contour image, and an encoder (36) for converting sequences of on/off bits into data words for transmission, via a modem (14) over a telephone line (15). At the other end of the line a similar transmitter/receiver system decodes the received words and reconstitutes the successive images for display on a screen (46). The resulting animated cartoon type of display is adequate for communication by sign language or by lip reading, and is capable of being sufficiently compressed to be transmitted over a normal telephone line.

- (2) U.S. Patent 5,163,081 for AUTOMATED DUAL-PARTY-RELAY TELEPHONE SYSTEM, By Bruce D. Wycherley et al., Issued November 10, 1992.

This invention relates to a facility for automating dual party relay service so that the cost of such a service may be reduced. The desired result is achieved by automating particular features of dual party relay service to appreciably decrease the amount of time that a service attendant is involved in a dual party relay call. Such automation is obtained by employing test-to-speech processing, and, on a limited basis, automatic speech recognition.

- (3) U.S. Patent 5,283,833 for METHOD AND APPARATUS FOR SPEECH PROCESSING USING MORPHOLOGY AND RHYMING, By Kenneth W. Church et al., Issued February 1, 1994.

This invention relates to a method and apparatus for natural language processing using morphology and rhyming. The method and apparatus employ a hybrid of dictionary and rule-based approaches for both speech and speech recognition. In an illustrative embodiment of the present invention the pronunciation of a word is determined by rhyming the word, or components of the word, with a reference word, or components of the reference word. In another illustrative embodiment of the present invention, the spelling of a word is determined by rhyming the word, or components of the word, with a reference word, or components of the reference word.

- (4) U.S. Patent 5,313,522 for APPARATUS FOR GENERATING FROM AN AUDIO SIGNAL A MOVING VISUAL LIP IMAGE FROM WHICH A SPEECH CONTENT OF THE SIGNAL CAN BE COMPREHENDED BY A LIPREADER, By Robert P. Slager, Issued May 17, 1994.

This invention relates to a device for facilitating comprehension by a hearing impaired person of a telephone conversation including a cord coupling to a telephone line a circuit which can convert the received audio speech signal into a series of phonemes. The

circuit also includes an arrangement which correlates the series of phonemes to respective human lip shapes and displays on a display device a succession of images of the respective lip shapes. This permits the hearing impaired person to carry out lip reading of the displayed lip shapes while listening to the telephone conversation, which improves the person's level of comprehension of the conversation.

- (5) U.S. Patent 5,473,705 for SIGN LANGUAGE TRANSLATION SYSTEM AND METHOD THAT INCLUDES ANALYSIS OF DEPENDENCE RELATIONSHIPS BETWEEN SUCCESSIVE WORDS, By Masahiro Abe et al., Issued December 5, 1995.

This invention relates to a sign language translation system and method that not only recognizes words of a sign language but also supplements omitted words between the words of the sign language, to thereby generate a spoken language. The sign language translation system has an input unit for inputting at least the motion of hands, a language generating unit responsive to the inputted motion of hands for recognizing the words corresponding to the motion of hands and generating a spoken language using the relationship between the recognized words, and an output unit for outputting the generated spoken language. The sign language translation system and

method can translate a sign language into an easy-to-understand spoken language.

- (6) U.S. Patent 5,481,454 for SIGN LANGUAGE/WORD TRANSLATION SYSTEM, By Kiyoshi Inoue et al., Issued January 2, 1996.

This invention relates to a sign language/word translation system which can cope with the case where no word corresponding to a hand operation is found. The system includes a configuration for taking a countermeasure against the finding of a plurality of words corresponding to a hand operation. When a word corresponding to a hand operation is not found in a sign language word dictionary, a finger operation is input, a character corresponding to the finger operation is searched for in a manual alphabet pattern dictionary, and the character train thus obtained is found from a character word dictionary, thereby producing an appropriate word. Also, a plurality of words found from the sign language word dictionary are displayed as translation candidates, and the user inputs by a hand operation as to whether the translation candidate is appropriate or not. The translation candidate that has been decided to be appropriate is determined as the word resulting from the translation.

- (7) U.S. Patent 5,544,050 for SIGN LANGUAGE LEARNING SYSTEM AND METHOD, By Masahiro Abe et al., Issued August 6, 1996.

This invention relates to, in a sign-language learning system, data of sign-language desired by a learner which can be outputted quickly and accurately and, moreover, in the display method matching the requirements of individual learners, and the individual learners can easily make additional registration. The sign-language data are stored in a sign-language dictionary, and desired sign-language data are searched on the basis of an entry word or contents by a dictionary search device. The searched sign-language data are displayed in a display output device in accordance with a requirement of a learner by image synthesis. The sign-language data are registered by a dictionary registration device.

- (8) U.S. Patent 5,659,764 for SIGN LANGUAGE GENERATION APPARATUS AND SIGN LANGUAGE TRANSLATION APPARATUS, By Tomoko Sakiyama et al., Issued August 19, 1997.

This invention relates to a sign language interpretation apparatus for performing sign language recognition and sign language generation which generates easily read sign language computer graphics (CG) animation by preparing sign language word CG

patterns on the basis of actual motion of the hand through the use of a glove type sensor to generate natural sign language CG animation, and by applying correction to the sign language word CG patterns. Further, in the sign language interpretation apparatus, results of translation of inputted sign language or voice language are confirmed and modified easily by the individual input persons, whereby results of translation of the inputted sign language or voice language are displayed in a combined form desired by the user to realize smooth communication. Also, candidates obtained as a result of translation are all displayed and can be selected easily by the input person with a device such as a mouse. Further, when a polysemous word is available, the word is displayed while being changed in its display form, and other expressions are confirmed and modified with the mouse.

- (9) U.S. Patent 5,689,575 for METHOD AND APPARATUS FOR PROCESSING IMAGES OF FACIAL EXPRESSIONS, By Hiroshi Sako et al., Issued November 18, 1997.

This invention relates to a real time output containing data relating to states of facial parts which is generated. A facial area detection unit (11) has monitoring (51-57) and determining (59-61) processing circuits operating in a pipelining manner to determine

position of the facial area. The monitoring circuits (51-57) monitor pixel value frequency using 3D histogram and backprojection processing. The generating facial area signal has masks applied by a unit (12) which supplies data to mouth area and eye area detection units (14, 15). Each of these operate on similar principles to the facial area detection unit (11).

- (10) U.S. Patent 5,734,794 for METHOD AND SYSTEM FOR VOICE-ACTIVATED CELL ANIMATION, By Tom H. White, Issued March 31, 1998.

This invention relates to a computer based system which utilizes cues extracted from audio speech to select from among a database of stored image cells to produce synthesized animated characters. A database of image cells is created by storing the face of an actor or other character articulating some 40 phoneme sounds, in 8 different emotions from 25 different camera angles. Audio speech is then analyzed and the faces are extracted based on phoneme sounds and emotion cues within the spectral information of the speech. The position of a user operated cameral controller is polled to determine a desired camera angle and the three image parameters (articulation, emotion and camera angle) are used to select an image from the

database associated with the phoneme. The selected images are interpolated to produce a smooth, life-like character or cartoon animation sequence, and then stored to a video recorder.

- (11) "Applications of Artificial Neural Networks IV", SPIE Vol. 1965, By Steven K. Rogers, 1993, pp. 589-599.

This article relates to a neural network which is used to extract relevant features of sign language from video images of a person communicating in American sign language or signed English. The key features are hand motion, hand location with respect to the body, and hand shape. A modular hybrid design is underway to apply various techniques, including neural networks, in the development of a translation system that will facilitate communication between deaf and hearing people. One of the neural networks described in the article is used to classify video images of hand shapes into their linguistic counterpart in American sign language. The video image is preprocessed to yield fourier descriptors that encode the shape of the hand silhouette. These descriptors are then used as inputs to a neural network that classifies their shapes. The network is trained with various examples from different signors and is tested with new images from new signors.

(12) "Bidirectional Translation Between Sign Language and Japanese for Communication with Deaf-Mute People", By Takao Kuwokawa et al., 1993, pp. 1109-1114.

This article relates to a proposal for a bidirectional machine translation between sign language and Japanese as an application of non-verbal interfaces. The translating system employs a sign dictionary for translating sign gestures to Japanese words and vice versa. While sign gestures tracked by gesture sensors in Japanese sentences are displayed, the system receives Japanese sentences and displays sign gesture animation.

None of the aforementioned patent documents are believed to negate the patentability of the present invention. A listing of the prior art documents on Form PTO-1449 is enclosed herewith.

I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, DC 20231

on June 23, 2000
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Respectfully submitted,

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